

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
4 November 2004 (04.11.2004)

PCT

(10) International Publication Number  
**WO 2004/094468 A3**

(51) International Patent Classification<sup>7</sup>: **C07K 14/315,**  
A61K 39/40

(74) Agents: **ROQUES, Sarah, Elizabeth et al.**; J.A. Kemp &  
Co., 14 South Square, Gray's Inn, London WC1R 5JJ (GB).

(21) International Application Number:  
PCT/EP2004/004429

(22) International Filing Date: 23 April 2004 (23.04.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
0309246.7 23 April 2003 (23.04.2003) GB  
0329112.7 16 December 2003 (16.12.2003) GB

(71) Applicant (for all designated States except US): **HANSA  
MEDICAL RESEARCH AB** [SE/SE]; Edison Park,  
S-223 69 Lund (SE).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **BJÖRCK, Lars**  
[SE/SE]; Magle Stora Kyrkogata 10, S-223 50 Lund (SE).  
**HERWALD, Heiko** [DE/SE]; Kyrkogatan 8, S-24014  
Veberöd (SE). **MÖRGELIN, Matthias** [SE/SE]; Tre Hö-  
gars Väg 26B, S-224 75 Lund (SE). **RUSSELL, Wayne**  
[GB/SE]; Hallandsgatan 7, S-224 32 Kävlinge (SE).  
**NORRBY-TEGLUND, Anna** [SE/SE]; Gustavslundsvä-  
gen 19, S-144 63 Rönninge (SE). **LINDBOM, Lennart**  
[SE/SE]; Department of Physiology and Pharmacology,  
Karolinska Institutet, S-171 77 Stockholm (SE). **SOL-  
LENBERG, Ulla** [SE/SE]; Department of Physiology and  
Pharmacology, Karolinska Institutet, S-171 77 Stockholm  
(SE). **CRAMER, Henning** [DE/DE]; Ludwigshafener  
Strasse 50, 65929 Frankfurt (DE). **FLODGAARD, Hans**  
[DK/DK]; Melvillevej 6, DK-2900 Hellerup (DK).

(81) Designated States (unless otherwise indicated, for every  
kind of national protection available): AE, AG, AL, AM,  
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,  
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,  
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,  
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,  
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,  
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,  
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,  
ZW.

(84) Designated States (unless otherwise indicated, for every  
kind of regional protection available): ARIPO (BW, GH,  
GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),  
Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), Euro-  
pean (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR,  
GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK,  
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,  
ML, MR, NE, SN, TD, TG).

**Published:**

- with international search report
- before the expiration of the time limit for amending the  
claims and to be republished in the event of receipt of  
amendments

(88) Date of publication of the international search report:  
24 March 2005

For two-letter codes and other abbreviations, refer to the "Guid-  
ance Notes on Codes and Abbreviations" appearing at the begin-  
ning of each regular issue of the PCT Gazette.

(54) Title: METHOD FOR IDENTIFYING AN ANTI-STREPTOCOCCAL AGENT AND ITS USE FOR TREATING STREPTO-  
COCCAL INFECTIONS

(57) Abstract: A method for identifying an anti-streptococcal agent, comprises: (a) providing, as a first component, an isolated streptococcal M protein or a functional variant thereof; (b) providing, as a second component, isolated fibrinogen or a functional variant thereof; (c) providing, as a third component, an isolated  $\beta_2$  integrin or a functional variant thereof; (d) contacting said components with a test substance under conditions that would permit the components to interact in the absence of the test substance; and (e) determining whether the test substance inhibits the interaction between the components; thereby to determine whether a test substance is an anti-streptococcal agent.

WO 2004/094468 A3

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C07K14/315 A61K39/40

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C07K A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, BIOSIS, EMBASE, Sequence Search

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CUE D. ET AL.: "A nonpeptide integrin antagonist can inhibit epithelial cell ingestion of Streptococcus pyogenes by blocking formation of integrin alpha5beta1-fibronectin-M1 protein complexes." PROC. NATL. ACAD. SCI. USA, vol. 97, no. 6, 14 March 2000 (2000-03-14), pages 2858-2863, XP002306201 the whole document	15-19, 22-26
Y	----- -/--	1, 11-14, 27, 28

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents:

\*A\* document defining the general state of the art which is not considered to be of particular relevance

\*E\* earlier document but published on or after the international filing date

\*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

\*O\* document referring to an oral disclosure, use, exhibition or other means

\*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

\*Z\* document member of the same patent family

Date of the actual completion of the international search

12 January 2005

Date of mailing of the international search report

25/01/2005

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Giry, M

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DEMASTER E. ET AL.: "M+ group A streptococci are phagocytized and killed in whole blood by C5a-activated polymorphonuclear leukocytes." INFECT. IMMUN., vol. 70, no. 1, January 2002 (2002-01), pages 350-359, XP002313110	15,16
Y	abstract page 354, column 2 - page 356, column 1	1-14, 17-28
X	US 5 340 800 A (LIU D.Y. ET AL.) 23 August 1994 (1994-08-23) the whole document	15-19, 22-26
X	WO 03/014088 A (MERCK PATENT GMBH) 20 February 2003 (2003-02-20)	15,16
Y	claims 4-6,9 page 6 page 31 - page 32	17,18, 22-24, 27,28
Y	LEI B. ET AL.: "Evasion of human innate and acquired immunity by a bacterial homolog of CD11b that inhibits opsonophagocytosis." NATURE MEDICINE, vol. 7, no. 12, December 2001 (2001-12), pages 1298-1305, XP002243547 the whole document	1-28
Y	RUF A. ET AL.: "Platelet-induced neutrophil activation : platelet-expressed fibrinogen induces the oxidative burst in neutrophils by an interaction with CD11c/CD18." BR. J. HAEMATOL., vol. 90, 1995, pages 791-796, XP009042496 cited in the application the whole document	1-28
Y	SCHNITZLER N. ET AL.: "A co-stimulatory signal through ICAM-beta2 integrin-binding potentiates neutrophil phagocytosis." NATURE MEDICINE, vol. 5, no. 2, February 1999 (1999-02), pages 231-235, XP002313111 the whole document	1-28
Y	WO 95/27736 A (INGELHEIM PHARMACEUTICALS, INC.) 19 October 1995 (1995-10-19) the whole document	1-28
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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 00/34487 A (REGENTS OF THE UNIVERSITY OF MINNESOTA) 15 June 2000 (2000-06-15) the whole document	1-28
A	----- RASMUSSEN M. ET AL.: "Proteolysis and its regulation at the surface of Streptococcus pyogenes." MOL. MICROBIOL., vol. 43, no. 3, 2002, pages 537-544, XP002313112 the whole document	1-28
P,X	----- HERWALD H. ET AL.: "M protein, a classical bacterial virulence determinant, forms complexes with fibrinogen that induce vascular leakage." CELL, vol. 116, 6 February 2004 (2004-02-06), pages 367-379, XP002306203 the whole document	1-28

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/EP2004/004429

## Box No. I Nucleotide and/or amino acid sequence(s) (Continuation of item 1.b of the first sheet)

1. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, the international search was carried out on the basis of:
  - a. type of material
    - ☒ a sequence listing
    - ☐ table(s) related to the sequence listing
  - b. format of material
    - ☒ in written format
    - ☒ in computer readable form
  - c. time of filing/furnishing
    - ☒ contained in the international application as filed
    - ☒ filed together with the international application in computer readable form
    - ☐ furnished subsequently to this Authority for the purpose of search
2. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
3. Additional comments:

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/EP2004/004429

## Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.: 23-25, 28  
because they relate to subject matter not required to be searched by this Authority, namely:  
Although claims 23-25 and 28 are directed to a method of treatment of the human/animal body by therapy, the search has been carried out and based on the alleged effects of the compound/composition.
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP2004/004429

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